

ABSTRACT

A semiconductor device for the detection of a target DNA or RNA is provided, composed of: at least one insulating or semi-insulating layer; one conducting semiconductor layer; two conducting pads on the upper layer making electrical contact with the conducting semiconductor layer, such that electrical current can flow between them at a finite distance from the surface of the device; and a layer of at least one single-stranded DNA probe directly adsorbed on the surface of the upper layer which is either a conducting semiconductor layer or an insulating or semi-insulating layer. The DNA probe may have a sequence complementary to a sequence of the target DNA or RNA, e.g., a sequence of a gene responsible for a genetic disease or disorder, and the detection of the target DNA is carried out by hybridization with the probe and monitoring either the current change resulting from the hybridization process when a constant electric potential is applied between the two conducting pads or measuring the change in the electric potential required to keep a constant current.